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Status of Fe, Total Binding Capacity (Tibc) and Transferring Saturation in Camels (*Camelus dromedarius*)

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Abstract: The present study was designed to establish reference values for blood concentrations of iron (Fe), Total Iron Binding Capacity (TIBC) and transferring saturation % in camels (*Camelus dromedarius*). A total of 375 camels of different age groups, sexes were used in this trial. The study indicated that sex did not have a discernable effect on Fe, TIBC and saturation %. Age was a significant variable for Fe and TIBC, but saturation did not differed. Reference ranges for Fe serum concentration, TIBC, and transferring saturation were 166±24.8 μg dL^{-1}, 361±30.5 and 56.3%, respectively.

Key words: Camel, iron, transferring, saturation

INTRODUCTION

Iron is a mineral, which enables the transport of oxygen from the lungs to the tissues, stores oxygen in the muscle tissue, essential for hair growth and essential for a healthy immune system and mental function. Total binding capacity (TIBC) provides a measure of total serum transferring level, the primary serum Fe transport protein. Mineral studies in camels are scarce, using small number of animals, which are penned And no detailed investigations were carried under the field conditions. In addition, no investigations have examined possible interactions of age, sex And pregnancy status in the establishment of normal mineral blood levels. The objective of this study reported here was to establish reference value for FE, TIBC and transferring saturation % in the Sudanese camels (*Camelus dromedarius*).

MATERIALS AND METHODS

The study was conducted in Butana area, Central Sudan. A total of 375 Arabi camels (*Camelus dromedarius*) belonging to Lahawiyin tribe were used in this investigation. Camels were aged between 3 months to 7 years. They were checked for health status, by the aid of the herders, only apparently healthy animals were randomly selected. The camels were browsing on Acacia mellifera, Acacia nilotica, Blepharis perisca, Aristida adscensionis L.

Samples collections and analysis: Blood samples were collected from the jugular vein without using anticoagulant. Blood allowed to clot at 20 to 22°C for 30 min and centrifuged at 3000-x g for 10 min. sera were aliquoted and stored at –20°C until analysis. Fe was analysed spectrophotometrically. Sera were mixed with ferrozine to form a water-soluble magneta-colored complex. TIBC analysis was carried using an anion exchange resin protocol Group differences for FE, TIBC And saturation% were tested using Analysis of Variance (ANOVA). If significance ($p < 0.05$) was identified, Duncan Multiple Range Test (DMRT) was used for group comparison. Data are expressed as means±Sd.

RESULTS AND DISCUSSION

Table 1 presents detailed description of the groups of camels used in this study. Irrespective of age, the mean Fe concentration was 166±24.8 μg dL^{-1}, TIBC 361±30.7 and saturation 56.3%. Age-related differences were evident in the measured parameters (Table 2). As sex showed no effects, data for males and females were pooled for different adult group. As for the reproductive cycle, non-pregnant camels showed higher Fe than pregnant and lactating ones (Table 3).

The present investigation was conducted to establish baseline levels of FE, TIBC and saturation% in camels. In general, TIBC level is increased when serum FE concentration is low[1]. The % saturation is defined as the serum FE concentration divided by TIBC times 100 and provides a useful indication of what percentage of total carrying capacity is actually being utilized. Fe have an indirect antioxidant function, as it is required for the catalase activity; one of the enzymatic antioxidant in the body.

Table 1: Description of the camels (*Camelus dromedarius*) with respect to age, sex and reproductive status (n = 375)

Age group	Sex	Number
Neonate	Mel	53
	Female	48
Yearling	Male	67
	Female	70
Adult	Pregnant	42
	Non-pregnant, non lacting	38
	lacatating	57

Table 2: Normal values for Fe, TIBC and saturation % in sudanese camels (*Camelus dromedarius*) as a function of age

Analyte	Age	Mean
Fe (μg dL^{-1})	Neonate	184±37.8
	Yearling	129±45.2
	Adult	135±40.0
TIBC (μg dL^{-1})	Neonate	280±29.9
	Yearling	301±41.6
	Adult	407±33.0
Saturation %	Neonate	46.9
	Yearling	41.3
	Adult	40.0

Values are expressed as means±Sd

Table 3: Normal values for Fe, TIBC and saturation % in sudanese camels (*Camelus dromedarius*) in relation to reproductive cycle

Analyte	Age	Mean
Fe (μg dL^{-1})	pregnant	130±20.8
	non-pregnant	155±31.9
	lactating	125±19.7
TIBC (μg dL^{-1})	pregnant	308±21.9
	non-pregnant	291±30.0
	lactating	315±19.8
Saturation %	pregnant	42.2
	non pregnant	53.2
	lactating	39.6

Values are expressed as means±Sd

With regards to reproductive status, iron was higher in non-pregnant as compared with camels at different stages of pregnancy. This is in accordance with the data obtained in the Egyptian camels[2]. Serum FE concentration was found to be 70-148 and 68-183 μg dL^{-1} in llamas (4; 9), but lower that (192±11 μg dL^{-1} reported by[3]. TIBC is higher in llamas < 1 year old than in more mature ones[1]. In the field condition, it is not possible to ascertain Fe intake by camels. Normal TIBC for yearling llamas was 219-271 μg dL^{-1} decreasing to 204-356 μg dL^{-1} at 7 years of age (10). The mean serum iron concentration in llamas > 2 years was 101±21 μg dL^{-1}, TIBC was 300±39 μg dL^{-1} and saturation% was 34±6.6[1]. Previous studies indicated differences in mineral metabolism in the camelidae and the ruminants. Iron metabolism is more active in the liver and the spleen of the dromedary.

Factors affecting iron status include racing activity[4]; age (3,9); but not parasiteamia in free ranging guanacos[5]. Serum iron concentration, TIBC and transferring values may serve as a reference for evaluating camels with a suspected iron disorders. Free ranging guanaco showed iron level 1.71±0.54 μg mL^{-1}. In Saudi camels, the mean values iron and TIBC were 10.4±5.7 and 40.4±7.3 mu mol L^{-1}[6] The present investigation indicated that sex did not have a discernable effect on FE, TIBC and saturation%. This is in agreement with those findings in llamas[1].

In conclusion, age was found to be an important variable influencing the measured parameters. More detailed investigating of various trace elements in camels is needed to evaluate the nutritional and health status of camels.

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